

PERFORMANCE SPECIFICATIONS FOR SPEED-MEASUREMENT EQUIPMENT

Michigan Speed Measurement Task Force Revision October 10, 1997

This standard applies to speed-measurement equipment procured by law enforcement agencies for use in speed-enforcement programs in Michigan.

Radar Equipment

1. The radar model must meet the minimum standards established by the National Highway Traffic Safety Administration (NHTSA). In order to promote these model specifications, the International Association of Chiefs of Police (IACP) maintains a CONSUMER PRODUCTS LIST that identifies all radar models that have been fully tested and found to be in compliance with the appropriate specifications. Sole proof that a particular radar model meets those specifications will be that the device model is on IACP's CONSUMER PRODUCTS LIST.
2. The device shall be capable of measuring target vehicle speeds over the minimum speed range of 15 m.p.h. to 129 m.p.h.
3. Hand-held radar devices shall only transmit electromagnetic energy when a finger-operated trigger is pulled. When this trigger is released, the hand-held device shall cease to transmit electromagnetic energy; i.e., return to the RF-standby mode. No mechanism shall exist to lock the trigger in the transmit mode.
4. Fixed-mounted radar devices shall possess a suitable hardware for safely mounting the antenna and display module. Instructions for using this hardware shall be contained in the operator's manual for the radar device. This hardware and recommended mounting procedures shall take into account driver-side and passenger-side airbags, as well as other reasonable health and safety issues associated with the normal use of the radar device.
5. The target-signal processor channel and target-speed display shall function as specified in the test procedure in section 1221.79(g) of the NHTSA Model Performance Specifications at a speed of 15 m.p.h. (24 km/h) or the lowest speed specified by the manufacturer, whichever is lower, when operating in the stationary or moving mode. The target-signal processor channel and target-speed display shall function as specified in the test procedure in section 1221.79(g) of the NHTSA Performance Specifications at a speed of 129 m.p.h. (206km/h) or the highest speed specified by the manufacturer, whichever is higher, when operating in the stationary or moving mode.
6. The patrol signal-processor channel and patrol-speed display shall function as specified in the test procedure in section 1221.79(g)(3) of the NHTSA Model Performance Specifications at speeds down to 15 m.p.h. (24 km/h) or the lowest speed specified by the manufacturer, whichever is lower, when operating in the moving mode. The patrol signal-processor channel and patrol-speed display shall function as specified in the test procedure in section 1221.79(g)(3) of the NHTSA Model Performance Specifications at a patrol speed of 79 m.p.h. (126 km/h) or the highest speed specified by the manufacturer, whichever is higher, with target speeds to at least 129 m.p.h.
7. The minimum range for acquiring an approaching target, which is similar in size, shape and composition to a mid-sized, late-model automobile, shall be as follows:
 - a. Stationary-mode operation:
 - i. 300 ft. for the target vehicle traveling at 20 m.p.h.
 - ii. 1500 ft. for the target vehicle traveling at 60 m.p.h.
 - b. Moving-mode (opposite-direction) operation:
 - i. 600 feet for the target vehicle traveling at 30 m.p.h., with the patrol vehicle traveling

- at 25 m.p.h.
- ii. 2000 feet for the target vehicle traveling at 60 m.p.h., with the patrol vehicle traveling at 50 m.p.h.

These tests shall use a single target vehicle on clear, dry, level roadway with no interference present. The antenna shall be mounted in all positions recommended by the manufacturer (see Item 3). For inside mounting positions—if any are recommended by the manufacturer—the patrol vehicle's windshield shall be clean both inside and out.

8. Moving-mode radar devices that possess the hold-switch (RF-standby) feature must also pass the following field test:

The radar unit shall be mounted in all positions recommended by the manufacturer (see Item 3). The patrol vehicle shall be traveling at 35 m.p.h., plus or minus 1 m.p.h., with the RF-standby switch in the standby mode. A single target vehicle shall approach the patrol vehicle at 50 m.p.h., plus or minus 1 m.p.h. When the distance between the patrol vehicle and target vehicle is approximately 500 feet, the RF-standby switch should be switched to the transmit mode. The radar device must obtain and display the correct patrol speeds and target speeds within one and one-half (1.5) seconds after the RF-standby switch is placed in the transmit mode. Specific test conditions shall be the same as those indicated in Item 5 above.

9. The device shall possess the following features:

- a. A display-segment test.
- b. A Doppler-audio output that makes it useful to an operator in acquiring a target-tracking history for the full range of target and patrol speeds.
- c. A mechanism that warns the operator that RF interference is present and also automatically blanks the display before spurious readings due to this interference are observed.
- d. A mechanism that warns the operator that a low-voltage condition exists and also automatically blanks the display before spurious readings are observed due to this low-voltage condition and before there are any significant changes in the signal processing, Doppler-audio or display characteristics due to this low-voltage condition.
- e. A three-foot power cable (or optionally up to five-feet long) which is hardwired to the radar device and fitted at the other end with a male cigar type plug, "Safco No. 20" or an approved alternate with power-line fuse mounted into the plug for easy access and replacement.
- f. An on-off power switch and appropriate over-voltage protection.
- g. A range control which has a variable control capable of providing an approximate linear response (zero to maximum) over the full range of settings.
- h. A manual or automatic control for display window brightness for optimum visibility in both day and night operation.

10. The device shall not possess a manual speed-lock mechanism, unless (1) a second target-speed display window is present that permits the target's speed to be tracked through the lock condition and (2) provided the Doppler-audio output continues to track after the speed is locked. Tracking may cease once the device enters the RF-standby mode; i.e., the device no longer transmits electromagnetic energy.
11. The device shall not possess the "fastest-vehicle feature."
12. Each radar device shall be accompanied by the following items:
 - a. An operator's manual.
 - b. Appropriate mounting brackets for safely securing the antenna and display module. Safety considerations must include the possible presence of driver-side and passenger-side airbags,

as well as other reasonable health and safety issues associated with the normal use of the radar device.

- c. A list of factory authorized repair facilities in Michigan and adjacent states. Also, a statement of policy concerning support of facilities that are not factory authorized that may be utilized to repair the radar devices.
13. Radar devices may contain the following standard or optional features:
- a. An auxiliary speed display and lock with three (3) foot, four (4) foot, or five (5) foot connecting cable. (See Item 9 for special requirements if a speed-lock mechanism is present.)
 - b. An RF-standby switch, activated by an on-off toggle switch on a three (3) foot, four (4) foot, or five (5) foot connecting cable.
 - c. A service manual(s), to include complete schematics, printed circuit layout prints, parts list, and explanation of the technical theory of operation.
 - d. A luggage type carrying case.
 - e. An alternative power source (battery) complete with shoulder carrying strap and charger.
 - f. An alternative power cable(s) of four (4) foot or five (5) foot length.
 - g. An extended warrant and/or maintenance contract for up to five (5) years.
 - h. A spare and/or replacement outside-mounted antenna(s). (Note: The highest probability for equipment failure for two-piece radar devices is the antenna. Weather-proofed, outside-mounted antennas are very difficult to repair without damaging the weather proofing. As such, agencies might want to develop arrangements with the radar manufacturer to swap defective antennas with replacement antennas that are in proper working order and weather proofed. These replacement antennas may be new or re-conditioned. Antenna serial numbers may change during this exchange process, and this is permissible since only the serial numbers of display modules are placed on Task Force certificates.)
14. Radar devices shall be appropriate to the specific needs of the individual law enforcement agencies, the patrol vehicle(s) used, and the nature of the roadways on which the devices are operated.
15. The device shall be of rugged construction. Outside mounted antennas shall be weatherproof so as to prevent moisture and other forms of contamination from adversely affecting the device's performance or frequency of repair. And labels, connectors, switches, and dials shall be durable for the reasonable life of the device. Moreover, the device shall be capable of being maintained at a reasonable cost.

Lidar Equipment

1. The lidar model must meet the minimum standards established by the National Highway Traffic Safety Administration (NHTSA). In order to promote these model specifications, the International Association of Chiefs of Police (IACP) maintains a CONSUMER PRODUCTS LIST that identifies all lidar models that have been fully tested and found to be in compliance with the appropriate specifications. Sole proof that a particular lidar model meets those specifications will be that the device model is on IACP's CONSUMER PRODUCTS LIST.
2. The model shall be certified as Class 1 eye safe by the U.S. Department of Health and Human Services' Center for Devices and Radiological Health [Compliance Guide for Laser Products, U.S. Department of Health and Human Services, HHS Publication FDA 86-8260, September 1985 (or the latest revision of this document)]. (NOTE: Class 1 devices are considered eye-safe; i.e., these devices "have emissions in the ultraviolet, visible, and infrared spectra, and are limits below which biological hazards have not been established.")
3. The model shall comply with the limits for a Class A digital device as defined in Part 15C Radio Frequency Devices of the FCC Rules [Code of Federal Regulations: Telecommunication 47, Parts

0 to 19, U.S. Government Printing Office].

4. Hand-held devices shall only transmit laser energy when a finger-operated trigger is activated. When this trigger is released, the device shall cease to transmit energy. No mechanism shall exist to lock the trigger of a hand-held device in the transmit mode.
5. The highest minimum and lowest maximum range shall be 50 and 1,000 feet, respectively. (Note: This range requirement shall apply for a late-model, dark-colored, mid-sized automobile that is approaching the lidar.)
6. A means shall exist for the operator to verify that a device is in proper working order. Minimally, this verification procedure shall include the following:
 - a. Verify that the transmitted laser beam and the target-sighting optics are in proper alignment.
 - b. Verify that the device meets minimum target-range performance requirements.
 - c. Verify that the transmission, detection, timing, signal-processing, computation, and display circuitry are in proper working order with appropriate error indicators if a particular test fails.
7. The device shall not display any spurious (a.k.a., erroneous) readings due to either natural or man-made optical, electrical, or mechanical interference effectsC except for the panning effect, which constitutes improper operation of the device.
8. Standard items to be included with each device shall include: an operator's manual, all appropriate mounting brackets or supporting brackets, and a protective luggage-type carrying case to store and transfer the device.

Across-the-Road Laser Speed-Measurement Equipment

1. The model shall be certified as Class 1 eye safe by the U.S. Department of Health and Human Services' Center for Devices and Radiological Health [Compliance Guide for Laser Products, U.S. Department of Health and Human Services, HHS Publication FDA 86-8260, September 1985 (or the latest revision of this document)]. (NOTE: Class 1 devices are considered eye-safe; i.e., these devices "have emissions in the ultraviolet, visible, and infrared spectra, and are limits below which biological hazards have not been established.")
2. The model shall comply with the limits for a Class A digital device as defined in Part 15C Radio Frequency Devices of the FCC Rules [Code of Federal Regulations: Telecommunication 47, Parts 0 to 19, U.S. Government Printing Office].
3. Hand-held devices shall only transmit laser energy when a finger-operated trigger is activated. When this trigger is released, the device shall cease to transmit. No mechanism shall exist to lock the trigger of a hand-held device in the transmit mode.
4. The device shall be capable of measuring target vehicle speeds *accurately* over the minimum speed range of 5 m.p.h. to 195 m.p.h. The device shall be deemed *accurate* if-under well controlled laboratory and field conditions-test results on the device meet each of the following laboratory and field evaluation criteria:
 - a. For reference speeds on the range of 5 to 195 m.p.h., laboratory testing demonstrates that the following two conditions are satisfied:
 - i. the *trueness* of the speed readings falls within the range of minus one (-1) to zero (0) m.p.h.;
 - ii. the maximum *range of differences* between the measured speed and the reference speed is minus two (-2) to plus one (+1) m.p.h.
 - b. For nominal vehicle speeds of 20, 50 and 70 m.p.h., field testing demonstrates that the

following two conditions are satisfied:

- i. the *trueness* of the speed readings-for each of the nominal vehicle speeds falls on the range minus one (-1) to zero (0) m.p.h.;
 - ii. the maximum *range of differences* between the measured speed and the reference speed is minus three (-3) to plus two (+2) m.p.h.
5. The device shall measure the speed of a target vehicle as it enters and leaves its operational area. If these two speed readings do not agree within plus or minus 1 m.p.h., no speed shall be displayed (or recorded), and a visual indication shall be provided to alert the operator that the speed-comparison test failed.
6. The minimum range for acquiring target speeds shall be 30 feet.
7. A means shall exist for the operator to verify that a device is in proper working order. Minimally, this verification procedure shall include the following:
 - a. Verify that the transmitted laser beams are in proper alignment.
 - b. Verify that the device meets minimum target-range performance requirements.
 - c. Verify that the transmission, detection, timing, signal-processing, computation, and display circuitry are in proper working order with appropriate error indicators if a particular test fails.
8. The device shall not display any spurious (a.k.a., erroneous) readings due to either natural or man-made optical, electrical, or mechanical interference.
9. Standard items to be included with each device shall include: an operator's manual, all appropriate mounting brackets or supporting brackets, and a protective luggage-type carrying case to store and transfer the device.



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